

character are called *duplex*, with the latter *simplex*. "Duplex" is dominant to "simplex."

A successful excursion to Charnwood Forest, under the guidance of Mr. Bell, took place on the Saturday (August 3), and an excellent idea of the vegetation of the uncultivated portions of the forest was gained by the members of the section.

ECONOMIC GEOLOGY IN THE UNITED STATES.

STRIKING evidence of the work which the United States Geological Survey is carrying on for the direct advancement of mining interests throughout the country is afforded by a batch of eight Bulletins recently received. These Bulletins cover 142 pages, and are copiously illustrated with plates and coloured geological maps. The most valuable of the series is Bulletin No. 315, dealing with contributions to economic geology in 1906, the object of which is to secure prompt publication of the economic results of investigations made by the survey. This Bulletin deals with the metals, structural materials, and other non-metals. A separate bulletin will be issued later dealing with survey work on coal, lignite, and peat. In investigations of ores during the year, reports are given by Mr. W. Lindgren on an interesting group of thin veins carrying wolfram in Boulder County, Colorado, which now constitute one of the most important sources of tungsten in the country; by Mr. H. S. Gale, on some new deposits of the uranium and vanadium-bearing mineral carnotite, which occur in the upturned Dakota sandstones east of the coal basins in Rio Blanco County, Colorado, deposits of importance as a further possible source of radium; and by Mr. G. F. Kay, on the deposits of silicate of nickel near Riddles, in Oregon. Much work was done in connection with iron ores, and reports are given on the red ores of the Birmingham district, Alabama, by Mr. E. F. Burchard; on the brown iron ores of the Russellville district, Alabama, by the same author; and on the grey iron ores of Talladega County, Alabama, by Mr. P. S. Smith. Mr. A. C. Spencer describes the magnetite deposits of Pennsylvania, and Mr. S. H. Ball the important iron-ore district at Hartville, Wyoming, and the titaniferous iron ore of Iron Mountain, Wyoming. An interesting investigation was made on glass-sands by Mr. Burchard. He gives the results of chemical and physical tests, not only of glass-sands now in use, but also of sands from undeveloped deposits which seem available for use as glass-making material. Prof. A. H. Purdue deals with the recently discovered phosphate fields of Arkansas, and Messrs. F. B. Weeks and W. F. Ferrier describe a new and important phosphate district at Montpelier, Idaho, in the western United States. The discovery has opened up a new industry in the West.

The progress of investigations of the mineral resources of Alaska in 1906 is dealt with in a separate report (Bulletin No. 314). An increase of nearly 50 per cent. in the value of the gold output of 1906 over that of the previous year is the best evidence of the advancement of the mining industry in Alaska. Copper mining has undergone a rapid expansion, and other mineral deposits, such as coal, marble, tin, and gypsum, have also received considerable attention. The progress has consisted in the development of the older districts rather than in discoveries of new mineral fields.

The Juneau gold belt, Alaska, forms the subject of a separate report by Mr. A. C. Spencer (Bulletin No. 287). This belt comprises the mainland strip of south-eastern Alaska from Berners Bay on the north-west to Windham Bay on the south-east, together with Douglas Island. The ores met with are mainly gold, though silver is usually present in small amounts. At the mines of the Treadwell group in Douglas Island, the methods of mining employed represent the highest possible attainment in the successful working of low-grade ores. For the last few years the average value of the material passing through the mills has been only about 8s. per ton.

The zinc and lead deposits of the Upper Mississippi Valley are described in great detail in a report by Mr. H. Foster Bain (Bulletin No. 294). The presence of ore

deposits in this region was well recognised as early as 1687, but the early work was restricted to lead mining, the zinc ores being disregarded. The rise in the price of zinc ore in 1899 attracted attention to the district, and since 1903 its development has been rapid. The author gives an account of the present condition of the district and a statement of ideas relating to the formation of ores. The geology of the district is simple. The region is one of unmetamorphosed, little disturbed, sedimentary rocks of Palæozoic age, and there are no igneous rocks nor recent ones near it. The ore-bearing rock is a massive dolomite. The ores, consisting of blende, smithsonite with galena and marcasite, occur in crevices, in honeycomb masses, in pitches and flats, and as disseminations. The ore bodies are doubtless due to concentration or reconcentration through the action of underground waters.

A geological reconnaissance in south-western Nevada and eastern California is described by Mr. Sydney H. Ball (Bulletin No. 308). Ore deposits in the area described appear to be confined to the Palæozoic rocks, the post-Jurassic granitoid rocks, and the older Tertiary rocks.

The economic geology of the Independence quadrangle, Kansas, is described by Mr. F. C. Schrader and Mr. Erasmus Haworth (Bulletin No. 296), who present the substance of what is known concerning the distribution, occurrence, and development of petroleum and natural gas in the quadrangle, and note briefly the more important industries growing out of these natural resources. Mr. F. C. Clapp describes the economic geology of the Amity quadrangle, Eastern Washington County, Pennsylvania (Bulletin No. 300). The main interest in this area, which is situated near the centre of the north end of the Pittsburgh coalfield, lies in the facts that it has been the seat of extensive petroleum and natural gas development, and that it is almost entirely underlain by at least one valuable seam of bituminous coal.

In the last report to be noticed Mr. E. C. Sullivan discusses the interaction between minerals and water solutions, with special reference to geological phenomena (Bulletin No. 312). Although not directly the result of geological field work, it has an important bearing on such work in that it is a chemical investigation of some of the problems most frequently met with in the study of the origin of ore deposits. Some of the changes that take place at ordinary temperature when water solutions are brought into contact with rock-forming minerals have been investigated. The result has been to make it apparent that chemical reaction between natural silicates and salt solutions is a very general phenomenon, taking place to a decided extent immediately upon contact, and that the outcome is mainly an exchange of bases in chemically equivalent quantities between solid and solution. The metal of the dissolved salt is precipitated, and an equivalent quantity of silicate is decomposed, and its bases enter the solution. Salt solutions as decomposing agents are much more active than pure water, and are comparable with acids in this respect.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

Two courses, open free to teachers in London schools, have been arranged at Bedford College for Women (University of London) for the Michaelmas term; they are:—(1) "The Organisation of Nature-study Courses in London Schools," lecturer, Miss M. R. N. Holmer, Saturdays, 10.30, beginning October 5; (2) "Geology for Teachers of Physical Geography," lecturer, Dr. C. A. Raisin, Wednesdays, 6 p.m., beginning October 9.

In connection with the garden produce, poultry, and honey competitions of the Kent County Council and of the National Potato Society at the South-Eastern Agricultural College, Wye, Kent, on Wednesday, October 2, a conference will be held, when an address will be given by the principal, Mr. M. J. R. Dunstan, to be followed by discussion.

Six lectures, open to the public without payment or ticket, on the "History of Statistics and the Nature and Aims of Modern Statistical Methods," will be given at

University College by Mr. G. U. Yule on Wednesdays at 5.30, commencing Wednesday, October 9. A course of ten lectures will be delivered on Saturday mornings, beginning on Saturday, October 12, by Mr. F. L. Grant, on "Recent Developments in the Teaching of Arithmetic." This course is open, without fee, to all teachers in London schools. Teachers wishing to attend should apply for forms to the executive officer, London County Council Education Offices, Victoria Embankment, W.C. Forms should be returned by Monday next, September 30.

At the autumnal meeting of the Association of Chambers of Commerce, held at Liverpool last week, the following resolution was carried:—"That it is of the highest importance that the education of boys be continued after leaving school; that employers be urged to use their influence in inducing boys to attend evening classes and to give facilities for such attendance; that in every locality there should be schools provided for secondary and commercial education and for teaching the scientific and artistic principles underlying local industries to boys and domestic economy to girls." The association also carried unanimously a resolution urging the Government to bring in at an early date, as foreshadowed in the King's Speech in 1905, a measure for the conversion of the Board of Trade into a Ministry of Commerce on modern and representative lines.

THE "Scholarships and Training of Teachers' Handbook" for 1907-8, just issued by the London County Council, gives particulars of the Council's scholarships and other scholarships open to London children, together with regulations for the admission of pupil teachers, bursars and student teachers, and for admission to training colleges, and a list of London secondary schools. The county scholarships of the Council provide a complete scheme under which a boy or girl may proceed by various stages from the public elementary school to the highest grades of education, whether at a university, technical college, or other institution providing advanced training for a professional career. The scholarships consist of junior county scholarships (ages of candidates, eleven to twelve), intermediate county scholarships (ages fifteen to seventeen), and senior county scholarships and exhibitions (ages, nineteen to twenty-two years). The first class (awarded to all candidates—about 2000—who reach scholarship standard) provides free education at public secondary schools approved by the Council, and a maintenance grant of 6*l.* a year; the second (not less than 100 scholarships), free education at approved secondary schools or technical colleges up to a fee of 25*l.* a year, and a maintenance grant of 25*l.* or 30*l.* a year; and the third class (fifty scholarships) provides a maintenance grant of 60*l.* a year for three years, and tuition and examination fees up to 30*l.* a year. In awarding these senior scholarships, regard is paid to the past successes of the candidates, the financial need, and the recommendations of the teachers under whom the candidates have worked. All candidates for scholarships may be required to present themselves for medical examination, and no award is confirmed if a candidate is found physically unfit to take advantage of a scholarship. In addition to the junior, intermediate, and senior scholarships, the Council awards a number of technical, industrial, and other scholarships, particulars of which are given in the handbook. All the scholarships are confined to candidates resident in the administrative county of London whose parents have incomes not exceeding 160*l.* a year in the case of the junior scholarships, and 400*l.* a year in those of the intermediate and senior scholarships.

SOCIETIES AND ACADEMIES.

PARIS.

Academy of Sciences, September 16.—M. A. Gaudry in the chair.—Observations on the electrical action of the sun and moon: Albert Nodding. This work was carried out at the observatory on the Pic du Midi, at an altitude of 2877 metres. The results generally confirm those obtained at lower altitudes; the sun induces a positive electric charge varying from 1 to 6 volts per minute, according to the state of the atmosphere. The solar charge is

absorbed by passing through a cloud or layer of moist air. The full moon produced a positive electric induction analogous to that of the sun.—A new flying apparatus called the gyroplane: Louis Breguet, Jacques Breguet, and Charles Richet. The lifting force is supplied by rotating planes, driven by a 40 horse-power motor. The apparatus sustained its own weight, together with that of a man (540 kilograms in all), for one minute at a height of 0.6 metre above the ground, and descended slowly as the velocity of the plane was reduced.—A method for the rapid estimation of carbon and hydrogen in organic substances: Pierre Breteau and Henri Leroux. The vapours driven off by heating the boat containing the substance in a current of oxygen are burnt by an electrically heated spiral of platinum wire, a diagram of the arrangement being given. It is claimed that the time required for a combustion is only from fifteen to forty minutes, according to the nature of the organic substance. No test analyses are given.—The conservation of the arterial pressure in man after the application of high-frequency currents in the form of autoconduction: J. Bergonié, André Broca, and G. Ferrié. The apparatus used gave a frequency in the solenoid of between 400,000 and 410,000, with effective intensities of between 15 and 20 amperes, or from seven to ten times greater than those described up to the present. The conditions for the most advantageous use of the apparatus are given, together with details of experiments on ten subjects. The net result is that high-frequency currents are without action on the arterial pressure.—Remarks on the preceding communication: M. d'Arsonval. A discussion of the possible sources of the discrepancies between the results given by the authors of the preceding paper and those of earlier observers.—The agents of coagulation of the milk contained in the juices of *Broussonetia papyrifera*: C. Gerber.—The light-receiving terminations in the compound eyes of the Muscidae: Pierre Vigier.

CONTENTS.

PAGE

The Geological Society of London. By J. W. G.	537
Ancient Babylonian Letters	539
Psychological Science. By W. B.	540
Theory and Practice of Lubrication. By Prof. F. W. Burstell	541
Our Book Shelf:—	
Hardy and Elkington: "The Savage South Seas"—C. G. S.	541
Hoskins: "A Text-book on Hydraulics, including an Outline of the Theory of Turbines"	542
Arnold: "Flora of Sussex, or a List of Flowering Plants and Ferns found in the County of Sussex"	542
Letters to the Editor:—	
Reconstruction of Diprotodon from the Callabonna Deposits, South Australia. (Illustrated.)—Prof. E. C. Stirling, F.R.S.	543
The Origin of Radium.—Dr. Bertram B. Boltwood	544
The Body of Queen Tii.—H. R. Hall	545
Use of the word "Telephotography."—R. Child Bayley; Dr. Shelford Bidwell, F.R.S.	546
Double Stars	546
Food Inspection and Adulteration. By C. Simmonds	547
Scientific Work in India	548
The Cullinan Diamond	549
New Laboratories at Queen's College, Belfast	550
Prof. L. F. Vernon-Harcourt	550
Notes. (Illustrated.)	551
Our Astronomical Column:—	
Astronomical Occurrences in October	555
Spectrum of Daniel's Comet (1907 <i>d</i>)	555
The Lowell Expedition to the Andes	555
September Meteors	555
Photographs of Phœbe	555
Solar Activity and Terrestrial Phenomena	555
The Juvisy Observatory	556
Botany at the British Association	556
Economic Geology in the United States	559
University and Educational Intelligence	559
Societies and Academies	560